

Tonsillitis

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Christos C. Georgalas, Neil S. Tolley, and Antony Narula

ABSTRACT

INTRODUCTION: The definition of severe recurrent throat infections is arbitrary, but recent criteria have defined severe tonsillitis as: five or more episodes of true tonsillitis a year; symptoms for at least 1 year; and episodes that are disabling and prevent normal functioning. Diagnosis of acute tonsillitis is clinical, and it can be difficult to distinguish viral from bacterial infections. Rapid antigen testing has a very low sensitivity in the diagnosis of bacterial tonsillitis, but more accurate tests take longer to deliver results. Bacteria are cultured from few people with tonsillitis. Other causes include infectious mononucleosis from Epstein-Barr virus infection, cytomegalovirus, toxoplasmosis, HIV, hepatitis A, and rubella. **METHODS AND OUTCOMES:** We conducted a systematic review and aimed to answer the following clinical question: What are the effects of tonsillectomy in children and adults with acute recurrent or chronic throat infections? We searched: Medline, Embase, The Cochrane Library, and other important databases up to April 2014 (Clinical Evidence reviews are updated periodically; please check our website for the most up-to-date version of this review). We included harms alerts from relevant organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA). **RESULTS:** We found 15 studies that met our inclusion criteria. We performed a GRADE evaluation of the quality of evidence for interventions. **CONCLUSIONS:** In this systematic review, we present information relating to the effectiveness and safety of the following interventions: cold-steel tonsillectomy and diathermy tonsillectomy.

QUESTIONS

What are the effects of tonsillectomy in children and adults with acute recurrent or chronic throat infections? . . . 3

INTERVENTIONS

TONSILLECTOMY

Beneficial

Cold-steel tonsillectomy (better peri- and postoperative outcomes than diathermy tonsillectomy in adults and children) 3

Trade off between benefits and harms

Tonsillectomy (reduces tonsillitis in children compared with no surgery but associated with morbidity) 6

Tonsillectomy (may reduce sore throat frequency in adults compared with no surgery but is associated with morbidity) 10

Key points

- Diagnosis of acute tonsillitis is clinical, and it can be difficult to distinguish viral from bacterial infections.
Rapid antigen testing has a very low sensitivity in the diagnosis of bacterial tonsillitis, but more accurate tests take longer to deliver results.
Bacteria are cultured from few people with tonsillitis. Other causes include infectious mononucleosis from Epstein-Barr virus infection, cytomegalovirus, toxoplasmosis, HIV, hepatitis A, and rubella.
- Acute tonsillitis with group A beta-haemolytic streptococci can occasionally cause rheumatic fever and acute glomerulonephritis, which can be prevented by treatment with penicillin.
In resource-rich countries, these complications are so rare that routine aggressive antibiotic use cannot be justified.
- Tonsillectomy, with or without adenoidectomy, is one of the most frequently performed surgical procedures in the UK.
- In adults, we found limited evidence from one small RCT that **surgery** may reduce sore throats at 5 to 6 months, but we found no longer-term evidence. **Tonsillectomy** may be associated with morbidity.
- In children, the effectiveness of **tonsillectomy** has to be judged against the potential harms. Tonsillectomy is more beneficial in children with severe symptoms, while in populations with a low incidence of tonsillitis, the modest benefit may be outweighed by the morbidity associated with the surgery.
- The use of **diathermy** in tonsillectomy in adults or children is associated with reduced rates of primary bleeding, but increased rates of secondary and overall bleeding.
Overall, **cold-steel dissection tonsillectomy** seems to have the lowest rates of postoperative haemorrhage and pain, although it is associated with slightly increased intra-operative bleeding. The use of diathermy in tonsillectomy must be weighed against its potential harms.
Adequate training in the appropriate use of diathermy during tonsillectomy is important. In deciding which method to apply, the surgeon should consider the underlying characteristics of patients, as well as the relative importance of secondary compared with primary bleeding and intra-operative blood loss compared with postoperative pain.

DEFINITION

The definition of severe recurrent throat infections is arbitrary, but recent criteria have defined severe tonsillitis as: five or more episodes of true tonsillitis a year; symptoms for at least 1 year; and

episodes that are disabling and prevent normal functioning.^[1] However, in most cases, the severity of recurrent throat infections depends on many factors and cannot be judged solely on the basis of its incidence. This definition does not include tonsillitis caused by infectious mononucleosis, which usually occurs as a single episode. However, acute tonsillitis in this situation may be followed by recurrent tonsillitis in some people. Tonsillitis may occur in isolation or as part of a generalised pharyngitis. The clinical distinction between tonsillitis and pharyngitis is unclear in the literature, and the condition is often referred to simply as 'acute sore throat'. A sore throat lasting for 24 to 48 hours as part of the prodrome of minor upper respiratory tract infection is excluded from this definition. Diagnosis of acute tonsillitis is primarily clinical, with the main interest being in whether the illness is viral or bacterial — this being of relevance if antibiotics are being considered. Studies have attempted to distinguish viral from bacterial sore throat on clinical grounds, but the results are conflicting, suggesting a lack of reliable diagnostic criteria. Investigations to assist with this distinction include throat swabs and serological tests, including the rapid antigen test and the anti-streptolysin O titre. Rapid antigen testing is convenient and popular in North America, but has doubtful sensitivity (61%–95%), at least when measured against throat swab results, although specificity is higher (88%–100%).^[1] However, the inevitable delay in reporting of both swabs and the antistreptolysin O titre reduce their value in the routine clinical situation.

INCIDENCE/ PREVALENCE	Recurrent sore throat has an incidence in general practice in the UK of 100 per 1000 population per year. ^[2] Acute tonsillitis is more common in childhood.
AETIOLOGY/ RISK FACTORS	Common bacterial pathogens include beta-haemolytic and other streptococci. Bacteria are cultured from only a minority of people with tonsillitis. The role of viruses is uncertain. In tonsillitis associated with infectious mononucleosis, the most common infective agent is the Epstein-Barr virus (present in 50% of children and 90% of adults with the condition). Cytomegalovirus infection may also result in the clinical picture of infectious mononucleosis, and the differential diagnosis also includes toxoplasmosis, HIV, hepatitis A, and rubella. ^[3]
PROGNOSIS	We found no good data on the natural history of tonsillitis or recurrent sore throat in children or adults. People in RCTs randomised to medical treatment (courses of antibiotics as required) have shown a tendency towards improvement over time. ^[4] ^[5] ^[6] ^[7] ^[8] Recurrent severe tonsillitis results in considerable morbidity, ^[9] including time lost from school or work. The most common complication of acute tonsillitis is peritonsillar abscess, but we found no good evidence on its incidence. Rheumatic fever and acute glomerulonephritis are recognised complications of acute tonsillitis associated with group A beta-haemolytic streptococci. These diseases are rare in resource-rich countries, but do occasionally occur. They are still a common problem in certain populations, notably Australian aboriginal people, and may be effectively prevented in closed communities by the use of penicillin. A systematic review found that antibiotics reduced the incidence of these diseases. ^[10] However, in resource-rich countries, these diseases are so rare that routine aggressive antibiotic use is not justified. The review also found that antibiotics shorten the duration of illness by about 16 hours overall. ^[10]
AIMS OF INTERVENTION	To abolish tonsillitis; to reduce the frequency and severity of recurrent throat infections; to improve general wellbeing, behaviour, and educational achievement, with minimal adverse effects.
OUTCOMES	<i>For all options, we report: episodes of tonsillitis or sore throat</i> (includes analgesia for tonsillitis or sore throat and antibiotic use); and <i>time off school or work</i> . <i>For options comparing surgical techniques versus each other, we also report: surgery: bleeding</i> (intra-operative and postoperative), and <i>surgery: postoperative pain</i> (includes analgesia use for pain from surgery).
METHODS	<i>Clinical Evidence</i> search and appraisal April 2014. The following databases were used to identify studies for this systematic review: Medline 1966 to April 2014, Embase 1980 to April 2014, and The Cochrane Database of Systematic Reviews 2014, issue 4 (1966 to date of issue). Additional searches were carried out in the Database of Abstracts of Reviews of Effects (DARE) and the Health Technology Assessment (HTA) Database. We also searched for retractions of studies included in the review. Titles and abstracts identified by the initial search, run by an information specialist, were first assessed against predefined criteria by an evidence scanner. Full texts for potentially relevant studies were then assessed against predefined criteria by an evidence analyst. Studies selected for inclusion were discussed with an expert contributor. All data relevant to the review were then extracted by an evidence analyst. Study design criteria for inclusion in this review were: published systematic reviews and RCTs in English language, at least single-blinded, and containing >20 individuals of whom >80% were followed up. There was no minimum follow-up for cold-steel tonsillectomy versus diathermy tonsillectomy. There was a minimum length of follow-up of 6 months to 1 year for tonsillectomy versus no surgery in adults or children. For this comparison, we have preferentially reported outcomes at 1 year where they have been reported. We excluded

all studies described as 'open', 'open label', or not blinded unless blinding was impossible. We included RCTs and systematic reviews of RCTs, where harms of an included intervention were assessed, applying the same study design criteria for inclusion as we did for benefits. In addition, we use a regular surveillance protocol to capture harms alerts from organisations such as the FDA and the MHRA, which are added to the reviews as required. To aid readability of the numerical data in our reviews, we round many percentages to the nearest whole number. Readers should be aware of this when relating percentages to summary statistics such as relative risks (RRs) and odds ratios (ORs). We have performed a GRADE evaluation of the quality of evidence for interventions included in this review (see table, p 14). The categorisation of the quality of the evidence (high, moderate, low, or very low) reflects the quality of evidence available for our chosen outcomes in our defined populations of interest. These categorisations are not necessarily a reflection of the overall methodological quality of any individual study, because the Clinical Evidence population and outcome of choice may represent only a small subset of the total outcomes reported, and population included, in any individual trial. For further details of how we perform the GRADE evaluation and the scoring system we use, please see our website (www.clinicalevidence.com).

QUESTION What are the effects of tonsillectomy in children and adults with acute recurrent or chronic throat infections?

OPTION COLD-STEEL TONSILLECTOMY VERSUS DIATHERMY TONSILLECTOMY

- For GRADE evaluation of interventions for Tonsillitis, see table, p 14 .
- The use of diathermy in tonsillectomy in adults or children is associated with reduced rates of primary bleeding but increased rates of secondary and overall bleeding.
- Overall, cold-steel dissection tonsillectomy seems to have the lowest rates of postoperative haemorrhage and pain, although it is associated with slightly increased intra-operative bleeding.
- Adequate training in the appropriate use of diathermy during tonsillectomy is important. In deciding which method to apply, the surgeon should consider the underlying characteristics of patients, as well as the relative importance of secondary compared with primary bleeding and intra-operative blood loss compared with postoperative pain.


Benefits and harms




Cold-steel tonsillectomy versus diathermy tonsillectomy:

We found two systematic reviews of RCTs (search date 2010, 2 RCTs; ^[11] and search date 2001, 6 RCTs), ^[12] both of which reported information on only complications of surgery. We also found one systematic review of observational data reporting on bleeding rates associated with surgery (see Comment). ^[13] We found two additional RCTs, ^[14] ^[15] and one subsequent RCT. ^[16]

Surgery: bleeding





Cold-steel tonsillectomy compared with diathermy tonsillectomy Cold-steel tonsillectomy may be associated with a higher rate of intra-operative blood loss, but we don't know which technique is associated with a lower risk of secondary bleeding (*very low-quality evidence*).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Intra-operative bleeding					
^[11] Systematic review	250 people having tonsillectomy or adenotonsillectomy by dissection or diathermy techniques 2 RCTs in this analysis	Intra-operative blood loss (mL) with cold-steel tonsillectomy with diathermy tonsillectomy Absolute results not reported	MD 22 95% CI 16 to 27 P <0.00001		diathermy tonsillectomy
^[12] Systematic review	444 people 6 RCTs in this analysis 4 RCTs were of paired design; 293 people	Mean intra-operative blood loss (mL) 33.7 with cold-steel tonsillectomy 15.1 with diathermy tonsillectomy See Further information on studies for details of difference in operating time	Significance not assessed		

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[14] RCT 3-armed trial	107 children (2–16 years) with chronic tonsillitis (at least 5 attacks per year and tonsil hypertrophy)	Mean intra-operative blood loss (mL) 73.8 with cold-steel tonsillectomy 29.6 with diathermy tonsillectomy The remaining arm evaluated a novel technique, 'PlasmaKnife' tonsillectomy Tonsillectomy occurred with or without adenoidectomies and grommets	P < 0.05		diathermy tonsillectomy
[16] RCT 3-armed trial	79 adults (18–53 years) with chronic tonsillitis	Mean intra-operative blood loss (mL) 38.1 with cold-steel tonsillectomy 9.9 with diathermy tonsillectomy The remaining arm assessed thermal welding tonsillectomy	Significance not assessed		
[16] RCT 3-armed trial	79 adults (18–53 years) with chronic tonsillitis	Primary bleeding 1/40 (3%) with cold-steel tonsillectomy 1/39 (3%) with diathermy tonsillectomy The remaining arm evaluated thermal welding tonsillectomy	Significance not assessed		
Secondary bleeding					
[11] Systematic review	250 people having tonsillectomy or adenotonsillectomy by dissection or diathermy techniques 2 RCTs in this analysis	Secondary bleeding 9/126 (7%) with cold-steel tonsillectomy 5/124 (4%) with diathermy tonsillectomy	Peto's OR 0.56 95% CI 0.19 to 1.63 P = 0.29 RCTs may have been underpowered to detect a clinically significant difference in this outcome		Not significant
[15] RCT	150 children (3–14 years) scheduled for tonsillectomy with or without adenoidectomy	Secondary bleeding, day 1 1/75 (1%) with cold-steel tonsillectomy 4/75 (5%) with diathermy tonsillectomy All children underwent adenotonsillectomy except for 4 receiving cold-steel and 6 receiving diathermy tonsillectomy only Non-significant between-group differences were also observed at days 5 and 7	P > 0.05		Not significant
[16] RCT 3-armed trial	79 adults (18–53 years) with chronic tonsillitis	Secondary bleeding 2/40 (5%) with cold-steel tonsillectomy 2/39 (5.1%) with diathermy tonsillectomy The remaining arm evaluated thermal welding tonsillectomy	Significance not assessed		

Surgery: postoperative pain

Cold-steel tonsillectomy compared with diathermy tonsillectomy Cold-steel tonsillectomy may reduce postoperative pain and need for analgesia compared with diathermy tonsillectomy (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Postoperative pain					
[12] Systematic review	293 people 4 RCTs in this analysis RCTs in meta-analysis were of paired design	Postoperative pain 33/293 (11%) with cold-steel tonsillectomy 148/293 (51%) with diathermy tonsillectomy See Further information on studies for details of difference in operating time	P = 0.001		cold-steel tonsillectomy
[15] RCT	150 children (3–14 years) scheduled for tonsillectomy with or without adenoidectomy	Mean postoperative pain (assessed using Wong-Baker FACES pain rating scale) , day 7 1.19 with cold-steel tonsillectomy 0.78 with diathermy tonsillectomy All children underwent adenotonsillectomy except for 4 receiving cold-steel and 6 receiving diathermy tonsillectomy only	Reported as not significant P value not reported Non-significant between-group differences were also observed at days 1 and 5		Not significant
[15] RCT	150 children (3–14 years) scheduled for tonsillectomy with or without adenoidectomy	Mean postoperative pain (assessed using Wong-Baker FACES pain rating scale) , day 3 1.59 with cold-steel tonsillectomy 2.27 with diathermy tonsillectomy All children underwent adenotonsillectomy except for 4 receiving cold-steel and 6 receiving diathermy tonsillectomy only	P <0.05		cold-steel tonsillectomy
[14] RCT 3-armed trial	107 children (2–16 years) with chronic tonsillitis (at least 5 attacks per year and tonsil hypertrophy)	Mean postoperative pain/discomfort (assessed using a visual analogue scale, 0 = no pain, 10 = very severe pain) , day 3 1.64 with cold-steel tonsillectomy 5.25 with diathermy tonsillectomy The remaining arm evaluated a novel technique, 'PlasmaKnife' tonsillectomy Tonsillectomy occurred with or without adenoidectomies and grommets	Significance not assessed		
[16] RCT 3-armed trial	79 adults (18–53 years) with chronic tonsillitis	Mean postoperative pain score (assessed using a 10 cm visual analogue scale, 1 = no pain, 10 = severe pain) , 4 hours–7 days post-surgery 4.5 with cold-steel tonsillectomy 6.35 with diathermy tonsillectomy The remaining arm evaluated thermal welding tonsillectomy	Significance not assessed		
Need for analgesia					
[11] Systematic review	47 people having tonsillectomy or adenotonsillectomy by dissection or diathermy techniques	Analgesia dose required after surgery , first 12 days with cold-steel tonsillectomy with diathermy tonsillectomy	MD 7.50 doses 95% CI 1.05 doses to 13.95 doses P = 0.023		cold-steel tonsillectomy

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
	Data from 1 RCT	Absolute results not reported			

Episodes of tonsillitis or sore throat

No data from the following reference on this outcome. ^{[11] [12] [14] [15] [16]}

Time off school or work

No data from the following reference on this outcome. ^{[11] [12] [14] [15] [16]}

Further information on studies

^[12] The review found that diathermy tonsillectomy reduced operative time (mean time per tonsil: 2.5 minutes with diathermy v 6.0 minutes with cold-steel; significance not assessed).

Comment: One systematic review (50 studies consisting of 10 RCTs, 15 non-randomised comparative studies, 14 case series, and 11 within-patient studies, as well as the population-based registry reports, from the Wales Single-use Instrument Surveillance Programme [3690 people] and the England and Northern Ireland National Prospective Tonsillectomy Audit [33,921 people]) evaluated the evidence for electrosurgery (diathermy or coblation) for tonsillectomy in children and adults, particularly in respect of rates of haemorrhage. ^[13] The review found that electrosurgery (coblation or diathermy dissection and haemostasis) was associated with higher rates of secondary bleeding (including haemorrhage requiring return to theatre) compared with cold-steel dissection with haemostasis with ties or packs. Cold-steel dissection was associated with higher rates of primary bleeding including return to theatre. Cold-steel dissection using ties or packs for haemostasis was associated with the lowest overall rate of postoperative bleeding (1.7%–2.0%); cold-steel dissection with bipolar diathermy haemostasis was associated with the lowest rate of haemorrhage requiring return to theatre (0%–0.7%).

Clinical guide:

Adequate training in the appropriate use of diathermy during tonsillectomy is important. In deciding which method to apply, the surgeon should consider the underlying characteristics of patients, as well as the relative importance of secondary compared with primary bleeding and intra-operative blood loss compared with postoperative pain. Overall, cold-steel dissection tonsillectomy seems to have the lowest rates of postoperative haemorrhage and pain, although it is associated with slightly increased intra-operative bleeding. The use of diathermy in tonsillectomy must be weighted against its potential harms.

OPTION TONSILLECTOMY VERSUS NO SURGERY IN CHILDREN

- For GRADE evaluation of interventions for Tonsillitis, see table, p 14 .
- In children, the effectiveness of tonsillectomy has to be judged against the potential harms.
- Tonsillectomy is more beneficial in children with severe symptoms, while in populations with a low incidence of tonsillitis, the modest benefit may be outweighed by the morbidity associated with the surgery.
- Tonsillectomy is associated with intra-operative and postoperative morbidity, including haemorrhage, while antibiotics are associated with adverse effects, such as rash.

Benefits and harms



Tonsillectomy versus no surgery in children:

We found three systematic reviews (search dates 1998, 2003, and 2008),^[17] ^[18] ^[19] which identified seven RCTs in total. We found one subsequent RCT.^[20]

Episodes of tonsillitis or sore throat


Tonsillectomy compared with non-surgical treatment Tonsillectomy may reduce the frequency of tonsillitis episodes in children (*very low-quality evidence*).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Sore throat					
^[17] Systematic review	1618 children with tonsillitis 5 RCTs in this analysis	Severe sore throat , 2 years with tonsillectomy with no surgery Absolute results not reported Review found that tonsillectomy resulted in 2.3 fewer episodes of severe sore throat in the first 2 years	Significance not assessed Potential bias in included RCTs; see Further information on studies for full details		
^[19] Systematic review	1436 children with tonsillitis 6 RCTs in this analysis 4 RCTs identified by review ^[17] The review also identified 7 controlled non-randomised studies	Reduction in episodes of sore throat with tonsillectomy with no surgery Absolute results not reported	Reduction of 1.2 episodes per year 95% CI 1.1 episodes per year to 1.3 episodes per year 2438 person-years analysed Possible underestimation of beneficial effect of tonsillectomy; see Further information on studies for full details All RCTs in meta-analysis had weak methods; see Further information on studies for full details	○○○	tonsillectomy
^[18] Systematic review	564 children with moderate to severe tonsillitis followed up for at least 1 year 4 RCTs in this analysis 2 RCTs identified by review ^[17] Variation in severity of tonsillitis in children in included RCTs; see Further information on studies for full details	Episodes of sore throat of any severity , 1–3 years with tonsillectomy or adenotonsillectomy with no surgery	mean difference –1.39 episodes 95% CI –1.69 to –1.08 episodes P <0.00001	○○○	tonsillectomy or adenotonsillectomy
^[18] Systematic review	564 children with moderate to severe tonsillitis followed up for at least 1 year 4 RCTs in this analysis 2 RCTs identified by review ^[17] Variation in severity of tonsillitis in children in included RCTs; see Further	Episodes of moderate or severe sore throat , 1–3 years with tonsillectomy or adenotonsillectomy with no surgery	mean difference –0.23 episodes 95% CI –0.35 to –0.12 episodes P = 0.000085 I ² = 80% The review concluded that one unpredictably timed episode of moderate or severe sore throat could be avoided in the first year post-surgery; see Further information on studies for full details	○○○	tonsillectomy or adenotonsillectomy

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
	information on studies for full details				
[20] RCT	268 children (5–15 years) with recurrent sore throats	Mean number of days of sore throat , year 1 31.0 with surgery (tonsillectomy and adenotonsillectomy with adenoid curettage and tonsillectomy by dissection or bipolar diathermy) 49.1 with no surgery (conventional medical treatment only)	Incidence rate ratio 0.67 95% CI 0.52 to 0.85 The study also reported mean episodes of sore throats per month and found similar results		tonsillectomy or adenotonsillectomy
[20] RCT	268 children (5–15 years) with recurrent sore throats	Mean number of days of sore throat , year 2 8.0 with surgery (tonsillectomy and adenotonsillectomy with adenoid curettage and tonsillectomy by dissection or bipolar diathermy) 20.2 with no surgery (conventional medical treatment only)	Incidence rate ratio 0.27 95% CI 0.16 to 0.46 Adjusted least squares regression over the 2 years demonstrated a significant reduction in sore throat episodes (mean): 5.5 with surgery v 9.0 with no surgery, MD 3.5, 95% CI 1.8 to 5.2		tonsillectomy or adenotonsillectomy

Time off school or work

Tonsillectomy compared with non-surgical treatment Tonsillectomy may reduce time off school because of tonsillitis (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Number of days off school					
[19] Systematic review	1436 children with tonsillitis 4 RCTs identified by review [17] The review also identified 7 controlled non-randomised studies	Number of days off school with tonsillectomy with no surgery Absolute numbers not reported	–2.8 days per person-year 95% CI –3.9 days per person-year to –1.6 days per person-year 1669 person-years analysed Possible underestimation of beneficial effect of tonsillectomy; see Further information on studies for full details All RCTs in meta-analysis had weak methods; see Further information on studies for full details		tonsillectomy

No data from the following reference on this outcome. [18] [20]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[4] RCT	91 children In review [18]	Complication rate with tonsillectomy with no surgery The RCT found that tonsillectomy was associated with a complication rate of 14%; all complications			

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		were 'readily managed or self-limiting'			
[6] RCT	Number of children unclear In review [18] 2 RCTs reported in 1 publication	Complication rate with tonsillectomy with no surgery The RCT reported that 16/203 (8%) children who had surgery suffered complications; results combined from both RCTs See Further information on studies for full details on types of complication reported			
[21] RCT	Number of children unclear In review [18]	Complication rate with adenotonsillectomy with no surgery The RCT reported that 12/195 (6%) children had a complication following adenotonsillectomy Primary haemorrhage occurred in 7/195 (4%) children, 2 of whom had their bleeding managed surgically Postoperative nausea occurred in 5/195 (3%) children			

No data from the following reference on this outcome. [17] [19] [20]

Further information on studies

- [17] The authors of the review noted high potential for bias in the RCTs they identified. Inclusion criteria in some of the older trials were not strictly defined, and encompassed upper respiratory tract infections, cervical adenitis, or 'children who would normally be placed in waiting list for adenotonsillectomy'.
- [18] Variation in severity of tonsillitis: three of the RCTs in the review (346 children) examined children with severe recurrent tonsillitis. One RCT looked at children with milder symptoms; 52% of those had tonsillectomy for indications other than recurrent throat infection. Children in both groups of the identified RCTs received antibiotics as needed for throat infections. Review conclusions: the review concluded that adenotonsillectomy or tonsillectomy would avoid one unpredictably timed episode of moderate or severe sore throat in more severely affected children in the first year post-surgery, at a cost of a predictable episode of pain in the immediate postoperative period.
- [19] The benign natural course of recurrent tonsillitis in children was demonstrated as children in the control group having had fewer episodes of sore throats during the follow-up period than before study entry (no absolute figures or significance assessment reported). However, in all of the included studies, the most severely affected children either opted for surgery or (in the earlier studies) were allocated to surgery, which may have resulted in an underestimation of treatment effect. In addition, the included studies assessed adenotonsillectomy, rather than tonsillectomy alone, and all RCTs and non-randomised trials had significant methodological limitations. Taking this into account, the authors of the review concluded that surgery provided an additional but small reduction in sore throat episodes and sore throat-associated school absence compared with no surgery.
- [6] One child suffered anaesthetic induction trismus and possible incipient malignant hyperthermia; three children had intra-operative haemorrhage, with one of them needing re-intervention under anaesthesia; and one child required a posterior nasopharyngeal pack and admission to intensive care. Seven children (3%) developed postoperative haemorrhage, and five of these were re-admitted to hospital, one requiring transfusion. The mean duration of postoperative sore throat was 6.3 days (range 0–21 days).

[20] The selection criteria were changed midway through the study from 'children with mild symptoms having six or more episodes in 2 years or eight or more episodes in 1 year, or children with moderate symptoms (sore throat for 5 days or more) having six or more episodes in 1 or 2 years' to 'children with four or more episodes of sore throat within each of 2 years or six or more episodes of sore throat within 1 year'. The criteria for defining episodes of sore throats were: minimum number of consecutive days on which a sore throat is recorded that can constitute an episode is 3 with no maximum number of consecutive days; any consecutive recording of sore throat interrupted by 4 days of non-recording constituted a new episode; periods of sore throat separated in time by less than 4 days with no recording of sore throat were pooled before application of the previous criteria.

Comment:**Antibiotics:**

One RCT (716 people with sore throat and an abnormal physical sign) found that the prescribing of antibiotics compared with no initial prescription significantly increased the proportion of people who returned to see their physician in the short term because of sore throat (return rate: 38% with initial antibiotics v 27% without initial antibiotics; adjusted HR for return 1.39, 95% CI 1.03 to 1.89). [22]

Clinical guide:

Tonsillectomy is one of the most frequently performed surgical procedures in the UK, particularly in children, and accounts for about 20% of all operations performed by otolaryngologists. [21]

Adenoidectomy is now performed with tonsillectomy in the UK only when there is a specific indication to remove the adenoids as well as the tonsils (32% of cases), although it remains common practice in both Europe and North America to combine the operations (the Netherlands: 90% of cases; USA: 84% of cases; and Canada: 75% of cases).

Decades of experience of using tonsillectomy for recurrent or severe throat infections in children have led to consensus that it is effective. However, it is suggested that the effectiveness of tonsillectomy has to be weighed against its potential harms. One Scottish tonsillectomy audit found that tonsillectomy was associated with a overall complication rate of 2% to 8%; less than 1% of children had primary haemorrhage (in the immediate postoperative period) or secondary haemorrhage. [23] Tonsillectomy results in a greater benefit in children with severe symptoms; for those with less severe symptoms, benefits must be judged (a reduction of approximately one episode, and 4 days' duration of sore throat in the first year) in light of the morbidity of surgery (one predictable episode of sore throat that can typically last 6 days).

We found no RCTs that found improved general wellbeing, development, or behaviour, despite suggestions that these are influenced by tonsillectomy. [23] We found no RCTs addressing long-term effects of tonsillectomy.

OPTION**TONSILLECTOMY VERSUS NO SURGERY IN ADULTS**

- For GRADE evaluation of interventions for Tonsillitis, see table, p 14 .
- We found limited evidence from one small RCT that surgery may reduce sore throats at 5 to 6 months, but we found no longer term evidence.
- Tonsillectomy is associated with intra-operative and postoperative morbidity, including haemorrhage.

Benefits and harms**Tonsillectomy versus no surgery in adults:**

We found one systematic review (search date 2008), [18] which identified one RCT in adults. [24]

Episodes of tonsillitis or sore throat

Tonsillectomy compared with no surgery Tonsillectomy may be more effective at reducing the frequency and duration of sore throat at 5 to 6 months, but we don't know the long-term effects (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Sore throat					
[24] RCT	70 adults with 3 or more episodes of pharyngitis in 6 months, or 4 episodes in 12 months, with at least 1 episode microbiologically confirmed to be caused by group A <i>Streptococcus</i> In review [18]	Episodes of sore throat , 5–6 months 0.6 with tonsillectomy 2.1 with waiting list control Episodes of sore throat was a secondary outcome; primary outcome was group A streptococcal pharyngitis	P = 0.001 Follow-up was only 5–6 months, which is not long enough to assess the effects of tonsillectomy fully	○○○	tonsillectomy
[24] RCT	70 adults with 3 or more episodes of pharyngitis in 6 months, or 4 episodes in 12 months, with at least 1 episode microbiologically confirmed to be caused by group A <i>Streptococcus</i> In review [18]	Days with sore throat , 5–6 months 3.2 with tonsillectomy 12.1 with waiting list control Days with sore throat was a secondary outcome; primary outcome was group A streptococcal pharyngitis	P = 0.002 Follow-up was only 5–6 months, which is not long enough to assess the effects of tonsillectomy fully	○○○	tonsillectomy

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[24] RCT	70 adults with 3 or more episodes of pharyngitis in 6 months, or 4 episodes in 12 months, with at least 1 episode microbiologically confirmed to be caused by group A <i>Streptococcus</i> In review [18]	Adverse effects with tonsillectomy with waiting list control Absolute results not reported The RCT reported no serious adverse effects related to tonsillectomy 2 people (6%) had mild secondary bleeding after the operation Tonsillectomy, on average, caused 13 days of postoperative throat pain			

Comment:**Clinical guide:**

Data from one good-quality RCT (albeit with limited follow-up) confirm the consensus that tonsillectomy is an effective treatment for adults with severe recurrent sore throat, and that it should be offered to patients, unless there are contra-indications, despite the absence of strong evidence from RCTs.

GLOSSARY

Low-quality evidence Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low-quality evidence Any estimate of effect is very uncertain.

SUBSTANTIVE CHANGES

Cold-steel tonsillectomy versus diathermy tonsillectomy One systematic review updated (2 RCTs, search date 2010).^[11] Three RCTs added.^{[14] [15] [16]} Categorisation unchanged (beneficial).

Tonsillectomy versus no surgery in children One RCT added.^[20] Categorisation unchanged (trade-off between benefits and harms).

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Christos C. Georgalas
Academic Medical Centre
University of Amsterdam
Amsterdam
Netherlands

Neil S. Tolley
ENT Consultant
Department of ENT
St Mary's Hospital
London
UK

Professor Anthony Narula
ENT Consultant
Department of ENT
St Mary's Hospital
London
UK

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GRADE Evaluation of interventions for Tonsillitis.

Important outcomes		Episodes of tonsillitis or sore throat, Surgery: bleeding, Surgery: postoperative pain, Time off school or work							
Studies (Participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
<i>What are the effects of tonsillectomy in children and adults with acute recurrent or chronic throat infections?</i>									
at least 9 (at least 780) ^{[11] [12] [14] [15] [16]}	Surgery: bleeding	Cold-steel tonsillectomy versus diathermy tonsillectomy	4	−2	0	−1	0	Very low	Quality points deducted for incomplete reporting of results and for RCTs possibly being underpowered to detect a clinically significant difference in one outcome; directness point deducted for no statistical analysis between groups in 1 RCT
8 (676) ^{[11] [12] [14] [15] [16]}	Surgery: postoperative pain	Cold-steel tonsillectomy versus diathermy tonsillectomy	4	−1	0	−1	0	Low	Quality point deducted for incomplete reporting of results; directness point deducted for no statistical analysis between groups in 2 RCTs
7 (at least 1886 children) ^{[17] [18] [19] [20]}	Episodes of tonsillitis or sore throat	Tonsillectomy versus no surgery in children	4	−2	0	−1	0	Very low	Quality points deducted for weak methods and incomplete reporting of results; directness point deducted for inclusion of adenotonsillectomy as main intervention
13 (1436) ^[19]	Time off school or work	Tonsillectomy versus no surgery in children	4	−2	0	−1	0	Very low	Quality points deducted for weak methods and incomplete reporting of results; directness point deducted for inclusion of adenotonsillectomy as main intervention
1 (70) ^{[18] [24]}	Episodes of tonsillitis or sore throat	Tonsillectomy versus no surgery in adults	4	−2	0	0	0	Low	Quality points deducted for sparse data and short follow-up
We initially allocate 4 points to evidence from RCTs, and 2 points to evidence from observational studies. To attain the final GRADE score for a given comparison, points are deducted or added from this initial score based on preset criteria relating to the categories of quality, directness, consistency, and effect size. Quality: based on issues affecting methodological rigour (e.g., incomplete reporting of results, quasi-randomisation, sparse data [<200 people in the analysis]). Consistency: based on similarity of results across studies. Directness: based on generalisability of population or outcomes. Effect size: based on magnitude of effect as measured by statistics such as relative risk, odds ratio, or hazard ratio.									